International Journal of Multicultural and Multireligious Understanding

http://ijmmu.com
editor@ijmmu.com
ISSN 2364-5369
Volume 9, Issue 8
August, 2022
Pages: 237-243

# The Effectiveness of Developing Diving Basic Teaching Materials in Improving Basic Diving Knowledge and Skills for Students at the Faculty Sports Science, Yogyakarta State University

Muhamad Nanang Solikhin; Sumaryanti; Hedi Ardiyanto H

Sport Science Department, Yogyakarta State University, Indonesia

http://dx.doi.org/10.18415/ijmmu.v9i8.4030

## *Abstract*

This study aims to examine the effectiveness of the basic teaching materials for diving which are used to improve the knowledge and basic skills of sports students at the Faculty of Sports Science, Yogyakarta State University. This research was compiled based on theoretical studies related to the results of the development of basic diving teaching materials to improve the knowledge and basic sports skills of the students of the Faculty of Sports Science, Yogyakarta State University. This research is a quantitative observational study by collecting qualitative data through direct observation in the field or research environment with an instrument for assessing basic diving knowledge and skills. This research takes place in the Yogyakarta State University Swimming Pool. The research sample in this research was carried out by purposive sampling with the sample criteria being students of the Faculty of Sports Science who mastered swimming skills in at least 2 swimming styles, consisting of 10 people. The research data were analyzed by Likert 5 scale method. Test the validity and reliability of the instrument for assessing the basic knowledge and skills of diving, with a validity value of 0.875 to 0.958 \geq V table 0.79, and the overall Cronbach's Alpha test results on test subjects were in the range (0.799 to 0.975) > 0, 60 then the questionnaire or questionnaire is declared reliable or consistent. The results of the comparison of the average pre-test and post-test gains were converted into the interpretation of gain values (Hake, 1998), to show the value of 0.856 0.7, which means that the teaching material product has a high influence on increasing basic diving knowledge and skills in the test subject group.

**Keywords:** *Teaching Materials; Sport Diving; Basic Skills*

## *Introduction*

SCUBA diving is an underwater diving activity in which the diver uses equipment completely independent of the surface supply to breathe underwater. SCUBA divers carry their own source of breathing gas, usually compressed air, giving them greater freedom of movement than other types of dives supplied from the surface directly, in addition to having longer underwater endurance compared to freediving or breath-holding dives ( Brubakk, A. et.al 2003). The underwater environment is principally not intended for humans where the compounds of water are denser than air causing poor sound and visibility, high pressure with increasing depth as well as decreasing temperature.

Understanding the physical nature of the underwater environment remains the best approach to minimizing risks during diving when a respiratory support system is required (Pendergast, et.al 2009). Basic skills in diving are also very necessary because diving has a very high risk of danger, especially if done carelessly without being supported by adequate mental and physical stamina, as well as diligent education and training.

Mastery of knowledge and basic skills of diving for beginner divers is done by providing specific teaching materials/teaching materials. Teaching materials are a set of facilities or a set of learning tools that contain learning materials, methods, limitations, and evaluation methods that are designed systematically and attractively in order to achieve the expected goals (Akbar, 2015). Teaching materials are one of the important supporting factors in learning. The use of teaching materials can improve student learning outcomes (Effiong., 2015). Teaching materials are a set of materials and resources that help teachers/lecturers and students in learning (Ifeoma, 2013). arranged hierarchically in the form of written and unwritten materials that can be used in the learning process. Diving basic sports teaching materials contain academic knowledge of diving which is useful in seeking safety and comfort when entering the aquatic environment, the direct and indirect effects of which include:

a. The concept of the applicable laws of physics due to the influence of Pressure on Surface and Underwater
b. Diving Physiology
c. Diving Biology
d. Diving Environment
e. Diving Equipment Introduction
f. Dive Table

Basic Diving Skills for Beginners consists of a component of mastery of skills that need to be trained and mastered so that divers can overcome various obstacles that arise as a result of entering the aquatic environment whose direct and indirect effects include:

a. Equalization Techniques
b. The Snorkeling System
c. Concept of Buoyancy
d. Underwater Communication
e. SCUBA Assembly
f. Executing the Dive
g. Dive Buddy

Based on this background, this study aims to determine the effectiveness of the results of developing diving teaching materials in increasing basic diving knowledge and skills for students of the UNY sports science faculty. The results of this research study are expected to be considered material for further development of diving as a material taught to UNY sports science students.

## *Research Method*

This research was compiled based on theoretical studies related to the results of the development of basic diving teaching materials to improve the knowledge and basic sports skills of the students of the Faculty of Sports Science, Yogyakarta State University. This research is a quantitative observational study by collecting qualitative data through direct observation in the field or research environment with an instrument for assessing basic diving knowledge and skills.

This research takes place in the Yogyakarta State University Swimming Pool. The research sample in this research was carried out by purposive sampling with the sample criteria being students of

the Faculty of Sports Science who mastered swimming skills in at least 2 swimming styles, consisting of 10 people. The research data were analyzed using a Likert 5 scale method. Test the validity and reliability of the basic diving knowledge and skills assessment instrument

Table 1. Instruments for assessing basic diving knowledge and skills

| Aspect | Element | Scale |
|---|---|---|
| Sport Diving Basic Skills Assessment Instrument | Snorkling | 1-5 Scale |
| | Duck Dive | 1-5 Scale |
| | Clearing Mask | 1-5 Scale |
| | Back Roll Entry | 1-5 Scale |
| | Giant Stride Entry | 1-5 Scale |
| | Exit Procedure | 1-5 Scale |
| | Equalizing Skill | 1-5 Scale |
| | Watter Trappen | 1-5 Scale |
| | SCUBA Asembly | 1-5 Scale |
| | Bouyency | 1-5 Scale |
| | Air Sharing | 1-5 Scale |
| Sport Diving Basic Knowledge Assessment Instrument | Sport Diving History | 1-5 Scale |
| | Diving Equipment Introduction | 1-5 Scale |
| | Basic Knowledge of Physical and Biological Sciences in Diving | 1-5 Scale |
| | Basic Knowledge of Physiology in Diving | 1-5 Scale |
| | Dive Planning Knowledge | 1-5 Scale |

The pretest and post-test data analysis techniques were carried out by giving concept understanding test questions and measuring the learning outcomes to see the level of effectiveness of the product. The increase in student learning outcomes obtained before and after using interactive teaching materials is calculated using the N-gain formula determined based on the average gain. The gain score (g) obtained is the result of a comparison between the average pretest and posttest scores. The average gain compared/N-gain (Hake, 1998) is expressed in the following equation.

$$g = (S\ post - S\ pre) / (S\ maks - S\ pre)$$

Information:

S post = Average posttest score
S pre = Average pretest score
S max = Max score

Furthermore, if this value is obtained, the next step is the value of this is converted into the interpretation of the gain value (Hake, 1998) as presented in the table below.

Table 2. Interpretation of gain value

| No | Value (g) | Clasification |
|---|---|---|
| 1 | (N-gain) ≥ 0,7 | High |
| 2 | 0,7 > (N-gain) ≥ 0,3 | Medium |
| 3 | (N-gain) < 0,3 | Low |

### *Result and Discussion*

This research was conducted with experimental test steps. Learning outcomes test through pre-test and post-test. The pre-test is an initial test before the experiment of giving teaching materials developed to the research sample is carried out and is the first step as a control. While the post-test is used for the final test of the experiment to test and find out whether the research sample in this case sports science students can understand and understand the basic teaching material of diving which was developed to obtain a complete picture of the abilities achieved after the end of the delivery of the lesson.

Tabel 3. Pre Test Results

| Instrument | Scale Score | N1 | N2 | N3 | N4 | N5 | N6 | N7 | N8 | N9 | N10 | ∑ item |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diving History Knowledge Evaluation | (1 -5) | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 11 |
| Diving Equipment Recognition Knowledge Assessment | (1 -5) | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 13 |
| Physical Sciences and Biological Sciences Aspects of Diving Knowledge Assessment | (1 -5) | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 18 |
| Basic Physiology aspects of Diving Knowledge Assessment | (1 -5) | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 18 |
| Dive Planning Knowledge Assessment | (1 -5) | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 19 |
| Snorkeling Skill | (1 -5) | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 13 |
| Duck Dive Skill | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Clearing Mask | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Back Roll Entry Skill | (1 -5) | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 11 |
| Giant Stride Entry Skill | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Exit Procedure | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Equalizing Skill | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Watter Trappen | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| SCUBA Assembling Skills | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Buoyancy Skill | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Air Sharing Skill | (1 -5) | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 10 |
| Total Score | | 22 | 18 | 19 | 21 | 17 | 20 | 19 | 19 | 19 | 19 | 193 |

Tabel 4. Post Test Results

| Instrument | Scale Score | N1 | N2 | N3 | N4 | N5 | N6 | N7 | N8 | N9 | N10 | ∑ item |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diving History Knowledge Evaluation | (1 -5) | 4.50 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 40.50 |
| Diving Equipment Recognition Knowledge | (1 -5) | 4.50 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 40.50 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Assessment | | | | | | | | | | | | |
| Physical Sciences and Biological Sciences Aspects of Diving Knowledge Assessment | (1 -5) | 4.50 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 40.50 |
| Basic Physiology aspects of Diving Knowledge Assessment | (1 -5) | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 40.00 |
| Dive Planning Knowledge Assessment | (1 -5) | 4.50 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 40.50 |
| Snorkeling Skill | (1 -5) | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 4.50 | 4.17 | 4.83 | 5.00 | 48.50 |
| Duck Dive Skill | (1 -5) | 5.00 | 4.67 | 4.57 | 4.57 | 3.83 | 3.67 | 3.17 | 4.67 | 3.50 | 5.00 | 42.64 |
| Clearing Mask | (1 -5) | 5.00 | 4.83 | 4.00 | 5.00 | 3.83 | 4.67 | 3.67 | 4.00 | 3.33 | 3.67 | 42.00 |
| Back Roll Entry Skill | (1 -5) | 5.00 | 4.00 | 5.00 | 4.00 | 3.67 | 5.00 | 4.67 | 3.67 | 3.83 | 4.83 | 43.67 |
| Giant Stride Entry Skill | (1 -5) | 5.00 | 5.00 | 4.86 | 4.86 | 3.67 | 5.00 | 3.00 | 5.00 | 4.83 | 5.00 | 46.21 |
| Exit Procedure | (1 -5) | 5.00 | 5.00 | 5.00 | 4.14 | 4.17 | 5.00 | 5.00 | 5.00 | 5.00 | 4.50 | 47.81 |
| Equalizing Skill | (1 -5) | 5.00 | 5.00 | 5.00 | 5.00 | 4.00 | 5.00 | 5.00 | 4.33 | 4.00 | 5.00 | 47.33 |
| Watter Trappen | (1 -5) | 5.00 | 5.00 | 5.00 | 4.86 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 49.86 |
| SCUBA Assembling Skills | (1 -5) | 5.00 | 5.00 | 5.00 | 4.86 | 3.83 | 4.83 | 5.00 | 5.00 | 5.00 | 5.00 | 48.52 |
| Buoyancy Skill | (1 -5) | 4.83 | 5.00 | 4.86 | 4.86 | 3.00 | 4.83 | 5.00 | 5.00 | 4.50 | 3.83 | 45.71 |
| Air Sharing Skill | (1 -5) | 5.00 | 5.00 | 4.86 | 4.86 | 5.00 | 4.83 | 4.83 | 5.00 | 5.00 | 4.17 | 48.55 |
| Total Score | | 76.83 | 73.50 | 73.14 | 72.00 | 65.00 | 72.83 | 68.83 | 70.83 | 68.83 | 71.00 | 712.81 |

The average gain data compared/N-gain (Hake, 1998) is expressed in the following equation

$g = (S\ post - S\ pre) / (S\ maks - S\ pre)$

S *pre* (Average pretest score) : 193 /10
: 19,3

S *post* (Average posttest score) : 712,81 /10
: 71,281

S *maks* (Max score) : 800 /10
: 80

N$g$ain : $(S\ post - S\ pre) / (S\ maks - S\ pre)$
:(71,281 – 19,3) / (80− 19,3)
: 0,856

The results of the comparison of the mean pre-test and post-test gains were converted into the interpretation of gain values (Hake, 1998), to show the value of 0.856 ≥ 0.7, which means that the teaching material product has a high influence on increasing basic diving knowledge and skills in the test subject group.

The principle of good teaching materials has the following characteristics (Mudlofir, 2011), as follows: (1) generates interest in reading (2) is written and designed for students (3) explains instructional objectives (4) is arranged based on flexible learning patterns ( 5) structure based on student needs and the final competencies achieved (6) provide opportunities for students to practice (7) accommodate student difficulties (8) provide a summary (9) communicative and semi-formal writing style (10) density based on student needs (11) packaged for the instructional process (12) has a mechanism to collect feedback from students (13) explains how to learn teaching materials.

The results of the interpretation of the pre-test and post-test gain values show a high influence value of the provision of basic diving teaching materials developed on the improvement of basic diving knowledge and skills in the test subject group, the product of diving teaching materials developed is a unitary learning unit that contains information, discussion, and easy-to-learn evaluation. The principles of the teaching materials tested can arouse students' interest in learning with clear instructional goals so that it is easy for students to learn, including motor skills. Lutan in Rohisfi & Neviyarni, (2021), is a process of learning motor skills in which a person develops a set of responses into a coordinated, organized, and integrated movement. Motor learning is a set of processes related to practice or experience that lead to permanent changes in skilled behavior. Learning motor skills is a skill in doing/implementing which shows a high skill set in the sense of actions that students have specifically, smoothly, and efficiently.

## *Conclusions*

The results of the study showed a high influence value of the provision of basic diving teaching materials developed on the improvement of basic diving knowledge and skills in the test subject group, the product of diving teaching materials developed is a unitary learning unit that contains information, discussion and evaluation that is easy to learn. The principles of the teaching materials tested are able to arouse students' interest in learning with clear instructional goals so that it is easy for students to learn, including motor skills. The principles of basic diving teaching materials can arouse students' interest in learning, instructional objectives and the presentation of structured materials are proven to facilitate students in increasing mastery of basic diving knowledge and skills.

## *References*

Akbar (2015). *Instrumen Perangkat Pembelajaran*. Bandung: PT. Remaja Rosdakarya

Brubakk, A. O., Neuman, T. S., Bennett, P. B., Elliott, D. H., and David, H.(2003). *Bennett and Elliott's Physiology and Medicine of Diving*. Philadelphia,PA: Saunders.

Effiong., Ekpo, O., & Charles, I. E.(2015). Impact of instructional materials in teaching and learning of bilogy in senior secondary schools in Yakurr LG A. International Letters of Social and Humanistic Science. International Letters of Social and Humanistic Sciences

Hake, R. R. (1998). Interactive-Engagement Versus Traditional Methods: A Six-Thousand-Student Survey OfMechanics Test Data For Introductory Physics Courses. American Journal of Physics, Vol. 66, No. 1.USA: Indiana University.

Ifeoma, M. M.(2013). *Use of instructional materials and education performance of student in integrated science (a case study of Unity Schools in Jalingo, Taraba state, Nigeria*). IOSR Journal of Research & Method in Education (IOSRJRME).Vol 3(4)

Mudlofir, A (2011). Aplikasi pengembangan KTSP dan bahan ajar dalam pendidikan agama Islam. PT RajaGrafindo Persada

Pendergast, D. R., and Lundgren, C. E. G. (2009). *The underwater environment: cardiopulmonary, thermal, and energetic demands*. J. Appl. Physiol. 106,276–283. doi: 10.1152/japplphysiol.90984.2008

Rohisfi, E.,Neviyarni, N.(2021). Analisis Belajar Keterampilan Motorik. JURNAL ILMU PENDIDIKAN. Vol.3 No.1. FIP Universitas Pahlawan Tuanku Tambusai